

John Wilson Education Society's Wilson College (Autonomous)

Chowpatty, Mumbai-400007
RE-ACCREDITED 'A' grade by NAAC

Affiliated to the

UNIVERSITY OF MUMBAI

Wilson College



Syllabus for F.Y
(Under NEP)

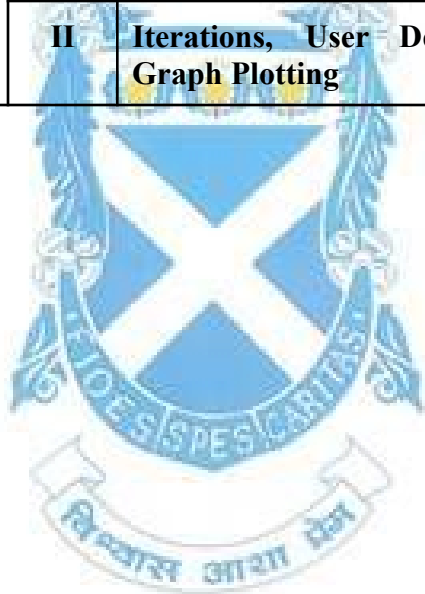
SKILL ENHANCEMENT COURSE

Programme Code: WSMATSE (Mathematics)

**Choice Based Credit System (CBCS) with effect from
Academic year 2023–2024**

PROGRAMME OUTLINE 2023-2024

YE AR	SEM	COURSE CODE	UNIT	NAME OF THE UNIT/UNIT TITLE	CREDIT S
FY	I	WSMATSE111		INTRODUCTION TO R-PROGRAMMING	2
			I	Introduction to R and More	
			II	Basic and Intermediate Methods	
	II	WSMATSE121		INTRODUCTION TO SciLab	2
			I	Introduction to SciLab	
II			Iterations, User Defined Functions and Graph Plotting		



SKILL ENHANCEMENT COURSE		SEMESTER I
COURSE: Introduction to R-Programming		COURSE CODE: WSMATSE111
Teaching Scheme		Evaluation Scheme
Practical (hours/week)	Credits	Semester End Practical Examination
4 lectures per batch (4 hours per batch)	2	60 marks
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To develop the skills of computers and programming. 2. To introduce the learner with techniques of data analysis. 3. To make the learner employable. 4. To develop software proficiency among the learners. 		
<p>Course Outcome:</p> <p>The learner will be able to</p> <ol style="list-style-type: none"> 1. Work with Objects (Focus on Vectors, Matrix operation) 2. Work with Dataframe,ETL and Data Manipulation (Load data from different Sources, SQL, CSV,etc) 3. Illustrate Descriptive Statistics and Tabulation 4. Apply Hypothesis Testing (t-Test, U-test) 5. Use Regression (Simple Linear) Analysis, Anova, Chi-square 6. Perform Graphical Analysis and reporting 		

DETAILED SYLLABUS

Course Code	Unit	Sub-Unit	Course/ Unit Title	Credits/ Lectures: 2 Credits/ 30 Lectures
WSMATSE111	I		Introduction To R and More	15 Lectures
		1.1	Introduction to R. Installation and working.	
		1.2	Packages, Using input, output and reusing results. Creating database, understanding data structures(vectors, matrices, arrays, data frames, factors, lists)	
		1.3	Data input from: keyboard, txt., excel, NetCDF	
		1.4	Accessing DBMS	
		1.5	Basic database management : creating, renaming variables, missing values, sorting data, merging dataset. Using SQL statements to manipulate DataFrame.	
	II		Basic and Intermediate Methods	15 Lectures
		2.1	Basic graphs - Barplot, Piechart, Histogram, Boxplots, Dot plots Fri data distribution.	
		2.2	Basic Statistics- Descriptive statistics using methods. Generating frequency tables(one way, two way).	
		2.3	Simple correlation, Multiple categories correlation (Chi-Squared test), covariance, correlation hypothesis.	
		2.4	ANOVA (one way, two way) and Fitting ANOVA models.	
2.5	Basic hypothesis test : t-test, U-test. Simple Linear Regression.			

References:

1. Robert I. Kabacoff. R in action, Data analysis and graphics with R, Second edition, Manning Shelter Island.
2. Gardener, M.(2017). Beginning R: The statistical programming language, WILEY.
3. Lawrence, M., & Verzani, J. (2016). Programming Graphical User Interfaces in R. CRC press. (ebook).

Web Resources:

1. <https://jrnold.github.io/r4ds-exercise-solutions/index.html>
2. <https://www.r-project.org/>
3. <https://cran.r-project.org/>



Practical	Credits
1. Installation of R.	2
2. Using packages, data structures.	
3. Basic Database management.	
4. Plotting graphs.	
5. Generating frequency table.	
6. Fitting ANOVA models.	
7. Hypothesis testing.	
8. Correlation and Covariance.	



SKILL ENHANCEMENT COURSE		SEMESTER II
COURSE: Introduction to SciLab		COURSE CODE: WSMATSE121
Teaching Scheme		Evaluation Scheme
Practical (hours/week)	Credits	Semester End Practical Examination
4 lectures per batch (4 hours per batch)	2	60 marks
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To develop the skills of computers and programming. 2. To introduce the learner with maths using computers. 3. To make the learner employable. 4. To develop software proficiency among the learners. 		
<p>Course Outcome: The learner will be able to</p> <ol style="list-style-type: none"> 1. Use SciLab software for Mathematics. 2. Experiment in the SciLab environment. 3. Learn Mathematical operators, polynomials, complex numbers, built-in and user defined functions, iterative and conditional statements in SciLab. 4. Apply the basic syntax for Matrix construction. 5. Operate matrices using SciLab. 6. Plot 2D and 3D graphs using SciLab. 		

DETAILED SYLLABUS

Course Code	Unit	Sub-Unit	Course/ Unit Title	Credits/ Lectures: 2 Credits/ 30 Lectures
WSMATSE121	I		Introduction To Scilab	15 Lectures
		1.1	Introduction to the software SciLab, Basic Syntax, Mathematical Operators, Complex Numbers, Polynomials, Built-in Functions, Sets in SciLab, Recursive relations in SciLab, factorials, gcd, lcm, binomial coefficients, permutations, combinations, partitions, sample space, probability in SciLab	
		1.2	Vector in SciLab, calculate length of a vector, perform mathematical operations on vectors, Matrix Construction, Algebraic operations on Matrices, Accessing rows and columns, determinant and inverse of a matrix	
	II		Iterations, User Defined Functions and Graph Plotting	15 Lectures
		2.1	“deff” command, iterative and conditional statements: for statement, if statement, while statement.	
2.2		2-D graphs and 3-D graphs		

References:

1. Rachna Verma Arvind Kumar Verma- Introduction to Scilab (Student Edition), First Edition.
2. Anil Kumar Verma, Scilab - A beginners approach, First Edition, Cengage.
3. Sandeep Nagar, Introduction to Scilab For engineers and scientists, First Edition, Apress.
4. Akhilesh Kumar, Programming using Scilab- Theory and Practicals, For B.Sc. Course of Pondicherry University..

Practical	Credits
<p>Write a program in SciLab</p> <ol style="list-style-type: none"> 1. To define a Set, find the cardinality of a set, find the number of proper subsets of a given set 2. To compute factorials using recursively defined functions 3. To evaluate a polynomial at a given value 4. To compute greatest common divisor and least common multiple 5. To calculate Binomial coefficients for given n and r. 6. To find number of words that can be formed from given word 7. To find number of ways to make a selection with specified conditions 8. To find the number of ordered and unordered partitions of a set 9. To find the probability of a given event 10. To enter a vector and perform given vector operations 11. To enter a matrix and perform given matrix operations 12. To plot graph from the given data 13. Using for, if and while statements 	<p>2</p>

Modality of Assessment
(for both semester I and II)

Semester End Practical Examination of 60 marks for a duration of 3 hours will be conducted where six questions of eight questions each of 10 marks will be asked. The learner is expected to write the program for the given question, execute the program and get the desired output.